

## CLAIMS:

1. A fiber rendering apparatus comprising:
  - a device for specifying a region of interest or volumetric region of interest
  - 5 in three-dimensional image data collected by a diffusion tensor method in an MRI apparatus;
  - a device for defining regular grid points in the region of interest or volumetric region of interest;
  - a device for defining points obtained by randomly moving the grid points
  - 10 in a two-dimensional or three-dimensional manner as tracking start points;
  - a device for performing diffusion tensor analysis on each tracking start point in the three-dimensional image data to determine a direction of a principal axis vector;
  - a device for tracking a fiber by repeatedly selecting a neighbor point along
  - 15 the direction of the principal axis vector and performing diffusion tensor analysis on the neighbor point to determine a direction of a principal axis vector; and
  - a device for producing and displaying an image of the tracked fibers as viewed in a desired view direction.
- 20 2. A fiber rendering apparatus comprising:
  - a device for defining tracking start points in three-dimensional image data collected by a diffusion tensor method in an MRI apparatus;
  - a device for performing diffusion tensor analysis on each tracking start point in the three-dimensional image data to determine a direction of a principal
  - 25 axis vector and a diffusion anisotropy value;
  - a device for tracking a fiber by repeatedly selecting a neighbor point along the direction of the principal axis vector and performing diffusion tensor analysis on the neighbor point to determine a direction of a principal axis vector and a diffusion anisotropy value; and
  - 30 a device for producing an image of the tracked fibers as viewed in a desired

view direction and displaying the image with opacity reflecting the diffusion anisotropy values at the tracking start points and neighbor points.

3. The fiber rendering apparatus of claim 2, wherein an FA value  
5 is used as the diffusion anisotropy value.

4. The fiber rendering apparatus of claim 13, wherein  
$$X_{n+1} = FA_n \cdot X_n,$$
  
where  $X_{n+1}$  represents an opacity at a neighbor point,  $FA_n$  represents an FA value  
10 at the immediately preceding neighbor point or tracking start point, and  $X_n$  represents an opacity thereat.

5. A fiber rendering apparatus comprising:  
a device for defining tracking start points in three-dimensional image data  
15 collected by a diffusion tensor method in an MRI apparatus;  
a device for performing diffusion tensor analysis on each tracking start point in the three-dimensional image data to determine a direction of a principal axis vector and eigenvalues of a diffusion tensor;  
a device for tracking a fiber by repeatedly selecting a neighbor point along  
20 the direction of the principal axis vector and performing diffusion tensor analysis on the neighbor point to determine a direction of a principal axis vector and eigenvalues of a diffusion tensor; and  
a device for producing an image of the tracked fibers as viewed in a desired view direction and displaying the image with display colors reflecting the  
25 eigenvalues of the diffusion tensors at the tracking start points and neighbor points.

6. The fiber rendering apparatus of claim 5, wherein a display color (R, G, B) is defined as:  
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$$R : G : B = 1 : \lambda_2 / \lambda_1 : \lambda_3 / \lambda_1,$$

where  $\lambda_1$ ,  $\lambda_2$  and  $\lambda_3$  represent eigenvalues of a diffusion tensor.